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A NEW *LOPHOSTOMA* (CHIROPTERA: PHYLLOSTOMIDAE: PHYLLOSTOMINAE) FROM THE AMAZONIA OF ECUADOR

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ABSTRACT

We describe a new species of phyllostomid bat, genus *Lophostoma*, from eastern Ecuador. *Lophostoma yasuni* n. sp. resembles *L. carrikeri* for its white venter and *L. shulzi* in size, but it is distinguishable from both by external and cranial characteristics.

Lophostoma yasuni has a shorter forearm than the average expected for *L. carrikeri*; however the skull is the largest in relation to *L. carrikeri* and *L. shulzi*. *L. yasuni* does not present the wart-like granulations on the forearms characteristic of *L. shulzi*.

RESUMEN

Describimos una nueva especie de murciélago filostómido del género *Lophostoma* del este de Ecuador. *Lophostoma yasuni* n. sp. es similar a *L. carrikeri* por su vientre blanco y a *L. shulzi* en tamaño, pero es distinguible de las dos por características externas y

craniales. *Lophostoma yasuni* tiene el antebrazo más corto que el promedio esperado para *L. carrikeri*; pero el cráneo es más grande en relación a *L. carrikeri* y *L. shulzi*. Además, *L. yasuni* carece de las granulaciones en los antebrazos que caracterizan a *L. shulzi*.

As currently recognized, the genus *Lophostoma* comprises six species: *L. aequatorialis* Baker et al. 2004, *L. brasiliense* (Peters 1866), *L. carrikeri* (Allen 1910), *L. evotis* (Davis and Carter 1978), *L. schulzi* (Genoways and Williams 1980, and *L. silvicolum* d'Orbigny 1836. During a survey of mammals in the Yasuní National Park and Biosphere Reserve in Ecuador (Fig. 1), we collected a specimen of *Lophostoma* externally similar to *L. carrikeri*. Further comparisons, however, revealed striking size and cranial morphology differences distinguishing the specimen from *L.*

carrikeri, and all other described species of *Lophostoma*. Its unique morphology indicates that this specimen represents an undescribed species that we name:

Lophostoma yasuni, new species

Holotype.—Adult male, Museo de Zoología (QCAZ 4935), Pontificia Universidad Católica de Ecuador (PUCE), from the vicinity of the Yasuní Research Station (00°30'S, 75°55'W, 220 m), Yasuní

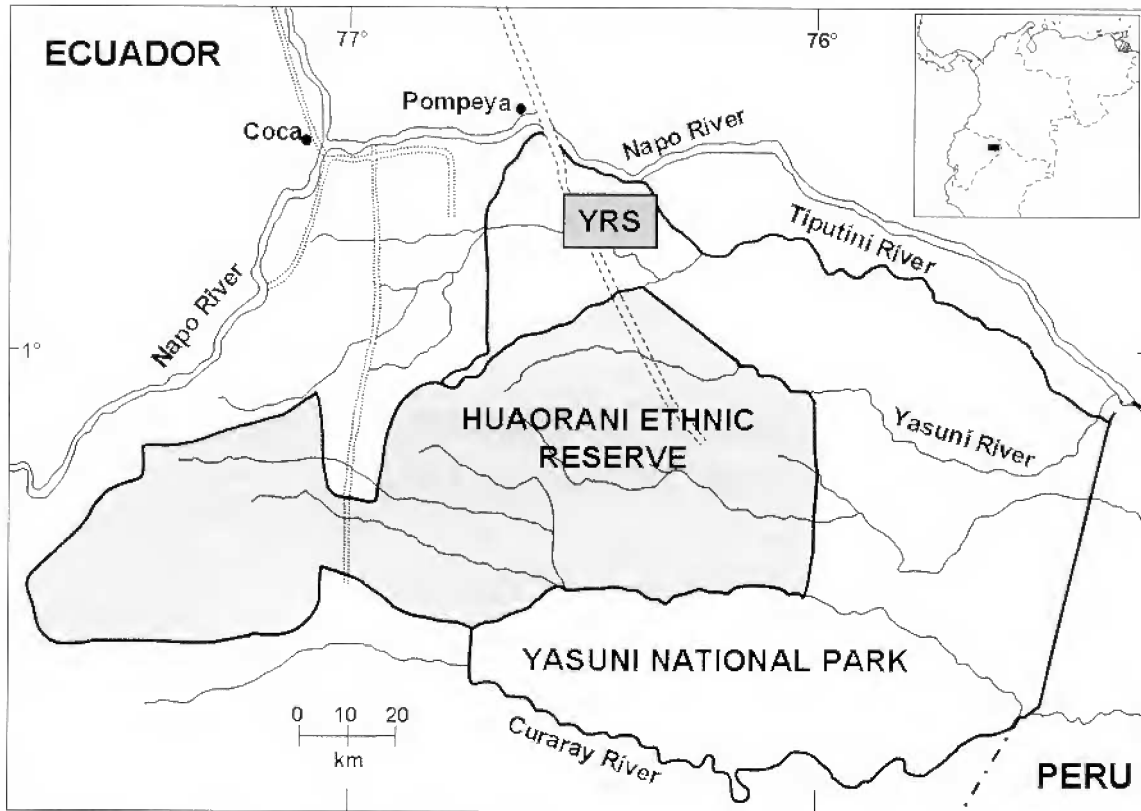


Figure 1. Map of the Yasuni National Park and Biosphere Reserve, Ecuador, showing the study area at the Yasuni Research Station (YRS), where *Lophostoma yasuni* was captured. The type locality is on the east side of YRS (see text for coordinates). Inset: Map of northwestern South America indicating location of Figure 1 in a black rectangle.

National Park and Biosphere Reserve, Province of Orellana, Ecuador. Collected by R. M. Fonseca and C. M. Pinto (field number RMFN 110) on 5 March 2001. The holotype consists of a stuffed skin and an incomplete skull that lacks lower incisors, lower canines, the second and third lower premolars, and the auditory bullae. The mandibles are separated at the mental symphysis.

Measurements.—External measurements of the holotype (in mm and grams), based on label information, are: total length, 82.8; tail, 14.9; foot, 14; ear, 22.5; mass, 25 g. Additional measurements (in mm) of holotype: forearm, 43.9; metacarpal digit III, 37.7; first phalanx digit III, 16.2; first phalanx digit IV, 16.5; first phalanx digit V, 15.1; length of tibia, 16.4; length of calcar, 13.1. Cranial and dental measurements of the holotype are included in Table 1.

Distribution.—Known only from the type locality.

Etymology.—The name is based on the Yasuni River, one of the most important tributaries within the Yasuni National Park and Biosphere Reserve. The meaning of the word Yasuni is unknown; its origin is most likely from a local indigenous language. We treat *yasuni* as a noun in apposition.

Diagnosis.—*Lophostoma yasuni* is medium-sized for the genus and the wings, ears, and interfemoral are dark brown to blackish, and generally darker than in other species. *Lophostoma yasuni* is most similar to *L. carrikeri* in having an all-white venter, although the ears lack the white margin that is conspicuous in most *L. carrikeri*. The forearm (43.9 mm) is shorter than that of *L. carrikeri* (which averages 46.1 mm), but the skull is larger (greatest length of skull, 25.9 mm versus a mean of 24.5 mm for male *L. carrikeri*). *Lophostoma yasuni* most closely approximates *L. schulzi* in forearm length (Table 1), but *L. schulzi* is otherwise smaller, has wart-like granulations on the forearms, and lacks the white venter. The fur behind

Table 1. Selected measurements of current recognized species of *Lophostoma* compared with *L. yasuni*. Mean and standard deviation (in parenthesis below mean values) are provided for each species when available. Data from *L. brasiliense*, *L. carrikeri*, and *L. yasuni*, came from the specimens examined. Published measurements were included for *L. aequatorialis* (Baker et al. 2004), *L. evotis* (Davis and Carter 1978), *L. schulzi* (from holotype; Genoways and Williams 1980), and *L. s. silvicolum* (Baker et al. 2004).

	<i>L. aequatorialis</i>		<i>L. brasiliense</i> ^a		<i>L. carrikeri</i>		<i>L. evotis</i>		<i>L. schulzi</i>	<i>L. s. silvicolum</i>		<i>L. yasuni</i>
	♂	♀	♂	♀	♂	♀	♂	♀		♂	♀	
FA	53.40	52.86 (1.37)	38.18	34.64	46	46.2 (1.82)	49.99	50.0 (1.99)	42.0	53.40 (1.46)	52.43 (1.48)	43.9
GLS	27.69	26.66 (0.7)	—	19.26	24.5	23.4 (0.58)	25.83	26.0 (0.81)	23.0	27.06 (0.47)	26.20 (0.62)	25.9
CBL	23.73	22.87 (0.69)	17.17	16.9	21.2	20.3 (0.6)	—	—	19.0	23.54 (0.40)	22.75 (0.56)	22.4
ZB	13.19	13.04 (0.47)	9.4	9.33	11.6	10.9 (0.53)	12.33	12.6 (0.35)	11.1 (0.28)	13.29	12.91	12.7
MB	13.89	13.16 (0.25)	9.42	9.44	12.3	11.4 (0.52)	—	—	11.6	13.43 (0.38)	13.0 (0.48)	12.7
BB	10.38	10.09 (0.23)	7.97	7.99	9.81	9.44 (0.26)	10.06	10.4 (0.1)	9.3 (0.23)	10.12 (0.35)	9.86	10.0
ICW ^b	—	—	1.14	1.22	1.5	1.5 (0.1)	—	—	—	2.0 (0.09)	1.90 (0.11)	1.7
IMW	—	—	—	—	3.4	3.2 (0.3)	—	—	—	—	—	3.8
PL	12.42	11.23 (0.20)	8.16	7.73	9.65	9.45 (0.26)	—	—	—	11.66	11.08 (0.45)	10.8
PC	4.45	4.26 (0.18)	3.11	3.19	4	3.8 (0.2)	—	—	3.5	4.16 (0.11)	4.12 (0.19)	4.1
RL ^b	—	—	5.9	6.7	9.67	9.42 (0.72)	—	—	—	10.92 (0.4)	10.31 (0.39)	10.27
M-M	9.0	8.61 (0.31)	6.16	6.38	7.62	7.38 (0.25)	7.97	7.8 (0.14)	7.3	8.58 (0.61)	8.53 (0.22)	8.8
C-C	6.06	5.55 (0.50)	4.05	4.17	4.97	4.45 (0.16)	5.55	5.2 (0.15)	—	6.22 (0.30)	5.74 (0.18)	5.5
INL ^b	—	—	1.35	1.23	1.51	1.66 (0.09)	—	—	—	2.12 (0.18)	1.97 (0.13)	2.12
MT	9.43	9.37 (0.30)	—	—	8.42	8.06 (0.23)	8.85	8.8 (0.2)	7.4	9.49 (0.27)	9.19 (0.30)	9.4
CP	—	—	—	—	6.2	5.8 (0.3)	—	—	—	—	—	7.2
ML	17.63	16.99 (0.40)	—	—	15.3	14.7 (0.42)	16.03	15.5 (0.48)	13.6	17.73 (0.38)	16.86 (0.40)	16.9

^a Data correspond to specimens QCAZ 553 (♂) and 1433 (♀).

^b Data from *L. s. silvicolum* was taken on the same specimens measured by Baker et al. (2004).

the ears is uniformly colored (ears lack a postauricular spot), and the base of the thumb is hairy. The rostrum is long and is depressed posteriorly in the interorbital region (Fig. 2). The paraoccipital processes are well developed; but the sagittal crest is only moderately developed, lambdoidal crests are relatively poorly developed, and the basisphenoid pits are shallow, almost imperceptible. In contrast, basisphenoid pits are well developed and divided by a conspicuous median septum in *L. carrikeri*. Upper tooththrows are robust and curved outward, a distinctive feature of *L. yasuni* (Fig.

3). The mandibles are slender and distinctly less massive than in *L. carrikeri*.

Description.—Dorsal fur is predominantly Blackish Brown dorsally (color terms from Ridgway 1912), with a small area on the lower back Mummy Brown. The dorsal fur has two dominant color bands; the basal band is Saccardo's Umber and covers two thirds of the fur length, the terminal third is Blackish Brown, and the tips of the longer hair is frosted paler. The ears, noseleaf, wing membranes, and uropatagium are

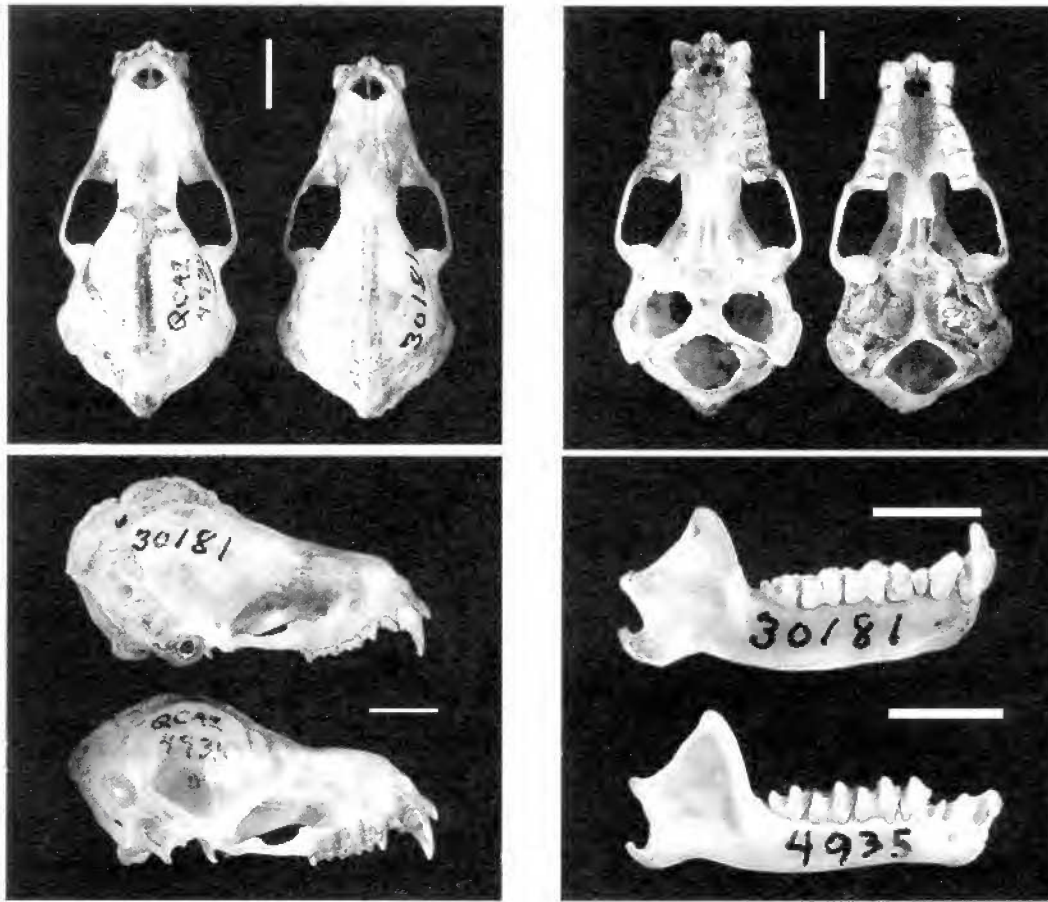


Figure 2. Dorsal, ventral, and lateral views of the skulls (showing actual size differences), and lateral view of the jaws (at different size scales) from the holotypes of *Lophostoma yasuni* (left and bottom, QCAZ 4935) and *L. carrikeri* (right and top, AMNH 30181). In all cases, scale bar equals 5 millimeters.

Chaetura Black. The proximal half of the ears are furred and the fur behind the ears is the same color as the dorsum (post auricular patches are lacking). The venter, from the chin to the genital region, was originally white, but has faded to Marguerite Yellow, subsequent to preservation. Ventral color is widest across the chest, but is restricted laterally over the stomach and abdomen by the uniformly Buffy Brown side of the body. The forearm is well furred proximally, Blackish Brown above and Buffy Brown below. The base of the thumb is furred. The skull is large and robust with an elongated rostrum, and deep infraorbital foramina (Fig. 2). In lateral profile, the skull is concave in the orbital region, the depression emphasized by the elevated nasals. The moderately developed sagittal crest arises immediately behind the nasals and reaches its maximum height above the parietals. The interparietal forms

a helmet-like projection above the ovoid foramen magnum. Lambdoidal crests are weakly developed. Paraoccipital processes are well developed and, while their posterolateral expansion is visible from above, they do not project posteriorly beyond the occipital condyles. The basioccipital is narrow, and basisphenoid pits are weakly developed, almost imperceptible, and faintly divided by a septum. The openings to the alisphenoid canal are small and round posteriorly, but longer and wider anteriorly. Pterygoid processes are widely divergent and extend well below the basicranium. The palate is long and extends posteriorly to a level slightly behind the postorbital constriction. The lateral indentations of the palate extend anteriorly to the level of the posterior margin of the second molar. The mandible is relatively slender and has a less convex lower margin and a slender angular process.

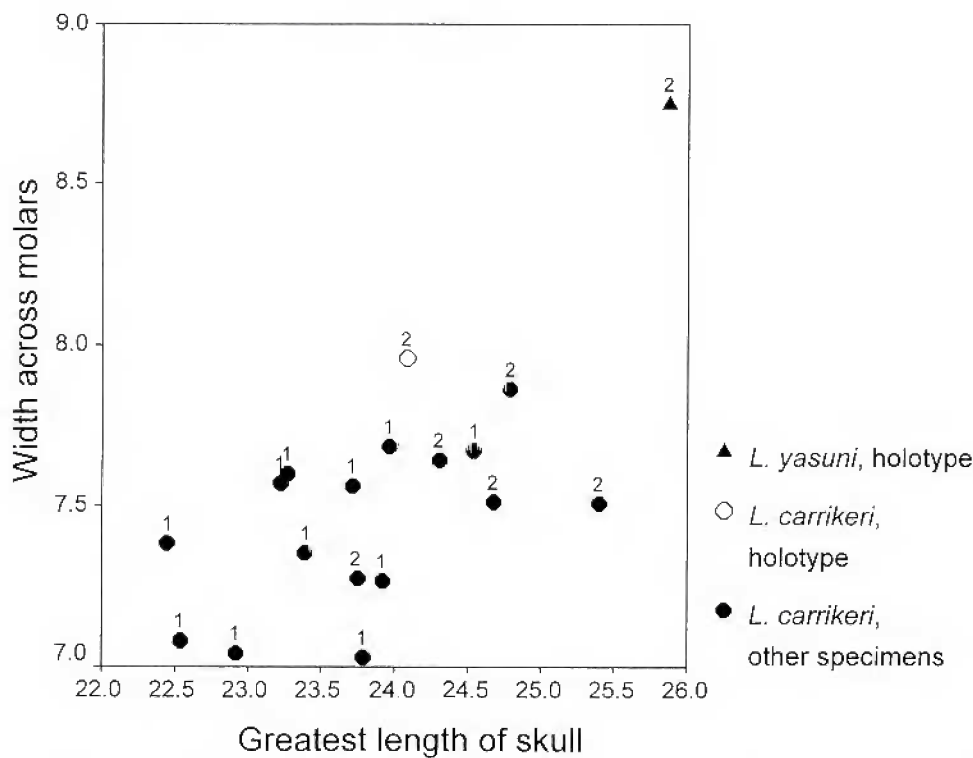


Figure 3. Scatter plot between two cranial variables associate with skull dimensions showing differences between *Lophostoma carrikeri* and *L. yasuni*. A number over symbol indicates sex of each individual (1 = female; 2 = male). Notice that *L. yasuni* has a larger skull and a broader width across the molars than all specimens examined of *L. carrikeri*.

The upper toothrow is curved outward and the premolars and first molars are clearly visible when the skull is viewed from above.

Comparisons.—Among known species, *L. yasuni* is closest to *L. carrikeri*, *L. evotis*, and *L. schulzi*. Although it shares having a white venter with *L. carrikeri*, *L. yasuni* has a shorter forearm (Table 1), lacks the thin white margin around the ears, has a larger skull (Fig. 3) with a pronounced depression in the rostral-frontal profile, and darker ears and flight membranes. *Lophostoma yasuni* resembles *L. evotis* in general cranial dimensions, but it is broader across the molars and has a much shorter forearm. While the forearm of *L. yasuni* is similar in length to the forearms of *L. schulzi*, *L. yasuni* has a distinctly larger skull and longer toothrows (compare measurements in Table 1), and lacks the wart-like granulations that

characterize *L. schulzi*. The pale-tipped (frosted) dorsal fur is less conspicuous in *L. yasuni* than in *L. carrikeri* and *L. silvicolum*. Dorsal frosting is inconspicuous in *L. schulzi*, and highly variable in *L. brasiliense*. Post-auricular patches are lacking in *L. yasuni*, *L. aequatorialis*, *L. brasiliense*, and *L. silvicolum*. The fur at the base of the thumb is darker in *L. yasuni* than in *L. carrikeri*. The thumb is less hairy in *L. aequatorialis*, *L. evotis*, and *L. silvicolum*; it is essentially naked in *L. brasiliense* and *L. schulzi*.

Remarks.—The holotype of *L. yasuni* was caught in a mist net placed in the subcanopy approximately 9 m above the ground in primary forest in the vicinity of the Yasuni Research Station in the Yasuni National Park and Biosphere Reserve. This national park, the largest protected area in Ecuador (Fig. 1), is in the western Amazon basin and encompasses ap-

proximately 15,000 km² of primary and secondary tropical lowland forest. The Yasuní Research Station is accessed by a 150-km-long road that crosses part of the Yasuní National Park through extensive primary lowland humid forest. At present, oil exploration camps and oil-drilling activities are the main human impact in the Yasuní National Park, including areas near the study site.

The habitat around the Yasuní Research Station consists of evergreen lowland forest (Palacios et al. 1999). This location combines terra firme and seasonally flooded habitats in the vicinity of the Río Tiputini. Monthly average temperatures during 1997-1998 was 28.2°C, the daily temperature varied from 21.5 to 34.7°C, and monthly precipitation ranged from 106 to 639 mm (Nabe-Nielsen 2001). The type locality is dominated by *Rinorea lindeniana* (Violaceae), *Quararibea oblongifolia* (Bombacaceae), *Marmoroxylon basijugum* (Fabaceae), and *Iriartea deltoidea* (Arecaceae) (see Romoleroux et al. 1997).

We set mist nets at ground level and in the subcanopy as high as 10 m above the ground to sample a variety of vegetation types with emphasis on terra firme habitats. We also collected the following species of bats at this site: Emballonuridae: *Saccopteryx*

leptura. Phyllostomidae: *Carollia brevicauda*, *C. castanea*, *C. perspicillata*, *Dermanura glauca*, *Lophostoma silvicolum*, *Micronycteris hirsuta*, *M. megalotis*, *M. minuta*, *Mimon crenulatum*, *Phyllostomus elongatus*, *P. hastatus*, *Rhinophylla pumilio*, *Tonatia saurophila*, *Uroderma bilobatum*, *Vampyroides caraccioli*, and *Vampyressa thyone*. Thyropteridae: *Thyroptera tricolor*.

It is tempting to recommend that *L. yasuni* be considered an endangered species because it is known only from a single specimen. However, such action is premature at this time. One can argue that the species has avoided detection for at least 150 years or longer, during the history of biological investigations in the western Amazon basin. Unfortunately, declaring *L. yasuni* as endangered will do nothing to protect the habitat it requires for survival. Furthermore, the type specimen was collected within the Yasuní National Park, a protected area with high oil exploitation and human colonization rates. Actions, beyond to place names in lists, are required to protect species and habitats. The biology of this unusual bat is unknown. Essentially all we know about this species is that it flies in the forest subcanopy and that it occurs with a large number of relatively common species of bats.

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SPECIMENS EXAMINED

Specimens examined in this study were deposited in the American Museum of Natural History (AMNH), New York; the Departamento de Ciencias Biológicas of the Escuela Politécnica Nacional (EPN), Quito; the Field Museum of Natural History (FMNH), Chicago; the Louisiana State University Museum of Zoology (LSUMZ), Baton Rouge; the Museo de Zoología (QCAZ) of the Pontificia Universidad Católica del Ecuador (PUCE), Quito; the National Museum of Natural History (USNM), Washington, D.C.; the Natural Science Research Laboratory at the Museum of Texas Tech University (TTU), Lubbock; the Museo de Historia Natural (MUSM) of the Universidad Nacional Mayor de San Marcos, Lima; and the Texas Cooperative Wildlife Collection (TCWC) at Texas A & M University, College Station. Specimens examined with respective museum numbers and localities are given below. Specimens examined from EPN are listed in Albuja (1999).

Lophostoma brasiliense (3) – Ecuador: Napo, Archidona, 1 ♂ (QCAZ 3339); Orellana, Río Napo Bajo, El Edén, 1 ♀ (QCAZ 1433); Sucumbios, Limoncocha, 1 ♂ (QCAZ 553).

Lophostoma carrikeri (21) – Bolivia: El Beni, Mamore, 1 ♀ (AMNH 20922). Brazil: Para, Belem, 1 ♂, 1 ♀ (USNM 393005, 460095). Colombia: La Meta, San Juan de Arama, 3 ♂, 3 ♀ (FMNH 87942–44, 88081–83). Peru: Loreto, Jenaro Herrera, 1 ♂ (MUSM 6977); Loreto, Río Curanja, Balta, 2 ♀ (LSUMZ 14076, 14077); Ucayali, Cerro Tihuayo, Pucallpa, 1 ♂ (MUSM 3158). Venezuela: T. F. Amazonas, San Juan, 1 ♂ (USNM 407274); Cerro Neblina, 1 ♂ (USNM 560556); Río Mocho, 2 ♂, 4 ♀ (AMNH 30179–80, 30181 [holotype], 30182–83).

Lophostoma evotis (3) – Belize: Columbia Forest Station, 2 ♂ (USNM 530948–49). Guatemala: Izabal, Puerto Barrios, 1 ♀ (TCWC 17142 [holotype]).

Lophostoma yasuni (1) – Ecuador: Orellana, Yasuní nacional Park and Biosphere Reserve, Yasuní Research Station, 1 ♂ (QCAZ 4935 [holotype]).

Lophostoma schulzi (3) – French Guiana: Paracou, near Sinnamary, 1 ♂, 1 ♀ (AMNH 267106, 267421). Guyana: Barima-Waini, Baramita, 1 ♂ (USNM 582274).

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APPENDIX I

Measurements for taxonomic comparisons used in this study. Description of measurements not included in this appendix is provided by Simmons and Voss (1998).

Calcar length, from the joint of the calcar with the foot to its posteriormost point.

Metacarpal III length, from the joint of the wrist (carpal bones) with the third metacarpal to the metacarpophalangeal joint of third digit.

First phalanx of third digit length, from the metacarpophalangeal joint to the proximal interphalangeal joint of the third digit.

First phalanx of fourth digit length, from the metacarpophalangeal joint to the proximal interphalangeal joint of the fourth digit.

First phalanx of fifth digit length, from the metacarpophalangeal joint to the proximal interphalangeal joint of the fifth digit

Condylbasal length (CBL), from the anteriormost point of the skull to the posteriormost point of the occipital condyles, excluding the incisors.

Palatal length (PL), from the anteriormost point of the palate behind the incisors to the beginning of the palatal extension, at the level of the interpterygoid fossa.

Rostral length (RL), from the anteriormost point of the skull to the fusion between the frontals and the nasals in superior view.

Upper middle incisors length (INL), from the superiormost point of the cingulum of the middle incisors to the tip of the tooth.

Internal width between canines (ICW), internal distance separating canines in the palatal region in occlusal view.

Maxillary toothrow length (MT), from the anteriormost point of the upper canines cingulum to the posteriormost point of the third upper molar.

Mandibular length (ML), from the anteriormost point of the mandible to the posteriormost point of the mandibular condyle, excluding the incisors.

Internal width between molars (IMW), internal distance separating molars in the palatal region in occlusal view.

Coronoid process (CP), distance between the most extreme points of the coronoid process and the condyloid process.